

PROJECT OPERATIONAL PLAN FOR THE
2003 ALEUTIAN ISLANDS
GOLDEN KING CRAB TAGGING SURVEY



By:

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Alaska Department of Fish and Game
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AUTHOR

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ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF COMMERCIAL FISHERIES

PROJECT OPERATIONAL PLAN

Title: Aleutian Islands Golden King Crab Project

Yellow Book Project No(s): CP-712

Project Leader: Leslie Watson PCN: 11-1428
Biometrician: Douglas Pengilly PCN: 11-1227

Date Submitted: May 2003

Region: Westward
Fishery Unit: Bering Sea/Aleutian Islands Crab
Fishery: Aleutian Islands Golden King Crab (Area O)
Fishery Management Plan: Fishery Management Plan for the Commercial King and Tanner Crab Fisheries of the Bering Sea/Aleutian Islands

APPROVALS

| Level | Signature | Date |
|-------------------------------|-----------|-------|
| Project Leader: | _____ | _____ |
| Biometrician: | _____ | _____ |
| Research Supervisor: | _____ | _____ |
| Regional Supervisor: | _____ | _____ |
| Headquarters' Receipt: | _____ | _____ |
| Headquarters' Approval | _____ | _____ |
| Headquarters' Recommendation: | | |
| Further Review: | _____ | _____ |
| Approval: | _____ | _____ |

ABSTRACT

This report describes the project operational plan for the 2003 Aleutian Islands golden king crab *Lithodes aequispinus* triennial tagging survey. A description of the objectives, survey area, sampling and tagging methodologies, data analysis and reporting, and inseason commercial fishery tagged crab recovery protocols are given. The survey will be conducted by Alaska Department of Fish and Game biologists aboard the chartered 56.4-m vessel, FV *Ballyhoo*. Seventy-three core stations and up to 11 secondary stations near Yunaska Island will be sampled using a series of ten-pot longline strings. A relative stock abundance index will be obtained and compared with indexes from the 1997 and 2000 triennial surveys of the Aleutian Islands golden king crab stock. All legal and pre-recruit male golden king crabs ≥ 121 -mm carapace length (CL) will be tagged and released for recovery in subsequent commercial fisheries. A subsample of captured female golden king crabs ≥ 90 -mm CL and sublegal male crabs 90 mm to 120 mm CL will also be tagged and released. Bottom water temperature profiles will be collected across the depth range of fished pots.

FOREWORD

The 2003 Aleutian Islands golden king crab project is funded under a federal grant to the State of Alaska (NOAA Award NA16FN2621). In 1991, under the funding support of the Bering Sea Test Fishery program, the Alaska Department of Fish and Game surveyed a portion of the golden king crab population in the Aleutian Islands (Blau and Pengilly 1994). In 1995, the department implemented a triennial king crab survey plan that included surveys of St. Matthew Island blue king crabs (1995 and 1998), Norton Sound red king crabs (1996), and Aleutian Islands golden king crabs (1997 and 2000). Survey reports are documented in Blau et al. (1998) and Watson and Gish (2002). Operational plans for the 1997 and 2000 Aleutian Islands golden king crab studies are in Watson and Blau (1997) and Tracy et al. (2000).

INTRODUCTION

The economic importance of the Aleutian Islands fishery for golden king crab *Lithodes aequispinus* is significant, with 155 million pounds landed from 1981 – 2001 at an exvessel value of nearly \$420 million (Bowers et al. 2002). Despite the value of the fishery, knowledge of golden king crab abundance, distribution, and basic life history parameters remains limited. In 1991, the Alaska Department of Fish and Game (ADF&G) conducted a tagging survey of golden king crabs as the basis for increasing information about stock status and distribution (Blau and Pengilly 1994). Triennial pot-based surveys of the Aleutians stock began in 1997 to establish a time series database for identifying species life history parameters and detecting population trends.

In 1997, a survey grid of 189 stations located between 52° and 53° N latitude and 169° and 173° W longitude was established based on historic fishery effort within that area (Watson and Blau 1997). The first triennial survey was conducted in August 1997 at 73 stations near Yunaska and Amukta Islands. Nearly 10,000 legal-sized and pre-recruit males and females were tagged during that survey and an intensive tag recovery effort was initiated during the subsequent September 1997 commercial fishery. The second triennial survey was conducted in July and August 2000 at 69 stations in the Yunaska-Amukta area (Watson and Gish 2002). Similar numbers of golden king crabs were tagged for recovery in the subsequent September 2000 fishery.

An effective golden king crab tag recovery program in the Aleutian Islands fishery was implemented when regulations were enacted in 1995 by the Alaska Board of Fisheries that expanded observer coverage to include all participating vessels (Morrison and Gish 1997). The current 100% observer coverage requirement is an incentive to continue the tagging program during triennial surveys by providing the opportunity to recover tagged crabs through daily monitoring of individual vessel catches. Nearly 20,000 golden king crabs were tagged during the 1997 and 2000 ADF&G surveys combined, with a total of 2,829 recoveries documented from commercial fishery recaptures in subsequent fisheries (Table 1). Analysis of the resulting release-recapture data has been the primary means of estimating natural mortality rates of male crabs (Siddeek et al. 2002) and determining growth increments and molting periodicity of male and female crabs (Watson et al. 2002).

This report describes the methodology for the conduct of the 2003 triennial golden king survey and subsequent tag recovery program for the 2003/2004 commercial fishery.

OBJECTIVES

Prioritized objectives for the 2003 Aleutian Islands triennial golden king crab survey and subsequent tagged crab recovery program in the 2003/2004 golden king crab commercial fishery are as follows:

1. Obtain a relative stock abundance index (pot survey catch per unit effort) of golden king crabs in the Amukta-Yunaska area of the Aleutian Islands during the summer of 2003.

2. Estimate spatial apportionment of fishing mortality, movement of crabs between seasons, and growth by tagging and releasing male and female golden king crabs during the 2003 Aleutian Islands pot survey and collecting tagged crab recovery information from the 2003/2004 and 2004/2005 Aleutian Islands golden king crab fishery seasons.

METHODS

The 2003 golden king crab 30-d survey will be conducted by the chartered 56.4-m (185 ft) vessel, FV *Ballyhoo* from July 1 to August 4, 2003, centered near Yunaska and Amukta Islands (52.5° N latitude and 171° W longitude). The charter will begin and end in Dutch Harbor, with a captain, engineer, three crewmen, and five ADF&G biologists aboard.

Survey Design

The survey area and station array is based on the survey grid established for the 1997 ADF&G survey and encompasses the section of Registration Area 'O' that has historically supported the major portion of golden king crab harvest (Blau et al. 1998). Examined harvest records and at-sea observer pot sampling data revealed that the majority of catch and effort prior to 1997 generally occurred between 170° and 172° W longitude. Harvest statistics and observer data were reexamined prior to the 2000 survey to select stations reflective of changes in catch and effort distribution. Comparison of catch records by statistical area between 1990-1996 and 1997-1999 revealed a slight westward shift in fishing effort since the 1997 survey (Tracy et al. 2000). Comparison of observer pot sample locations between the 1996-1997 and 1998-1999 fishing seasons revealed the same catch pattern.

The 2003 survey station grid encompasses the area between 52.25° – 53° N latitude and 170.25° – 171.6° W longitude and is composed of 74 core stations and 11 secondary stations spaced 5 nmi apart north-to-south and east-to-west (Figure 1). Station coordinates are listed in Appendix Table A.2. Each station will be sampled using 10 pots spaced 10 fm apart on a longline, with a target soak time of 48 h per pot. Seventy-five identical king crab pots measuring 7' x 7' x 34" supplied by ADF&G will be used. Each pot is webbed with #92 nylon twine with a stretch mesh of 2¾" and has two opposing 8" x 36" tunnel eye openings installed with fingers to reduce escapement of captured crabs from the pot. Each pot will be baited with one gallon of frozen chopped herring.

In the event that all 74 core stations have been successfully sampled, a set of 11 stations may also be fished (Figure 1). Adequate time to fish the core stations is expected; however, inclement weather and strong tidal currents may occasionally hamper survey progress. Approximately two of the 30 days allotted will be necessary for vessel travel to and from the survey grounds and up to two days for necessary gear preparation. The proposed survey itinerary is outlined in Appendix Table A.1.

Pot Deployment

Each station will be fished with a 10-pot string and on alternating days, stations will be set in groups of 3 or 4 as depicted in Appendix Figure A.1. Fishing parameters such as station and sequential pot number, set date and time, lift date and time, bottom type (rock, sand, silt, mud, or gravel), latitude and longitude, and gear performance will be reported on the Pilot House Log (Appendix Figure A.2).

Catch Sampling

The contents of each pot fished will be enumerated to provide catch per unit effort data for golden king crabs, scarlet king crabs *Lithodes couesi*, grooved Tanner crabs *Chionoecetes tanneri*, triangle Tanner crabs *C. angulatus*, and deep sea king crabs *Paralomis multispina* and *P. verrilli*. A determination of legal versus sublegal males, shell condition (age) of males and females, and female reproductive status will be assessed for each species. Carapace length (CL) of king crabs will be measured from the posterior margin of the right eye orbit to the midpoint of the rear margin of the carapace as in Wallace et al. (1949). Carapace width (CW) of Tanner crabs will be measured across the carapace at the widest part perpendicular to the medial line, with the tips of the calipers reaching inside the lateral spines.

Excluding legal males and prerecruit males ≥ 121 mm CL, a subsample of male and female golden king crabs for length distribution, shell condition, and female reproductive data may be taken. Subsampling of pot catches will only be done when successive pots within a station contain a large number of crabs and that sampling the full pot contents would unnecessarily delay overall survey progress. A minimum of 100 crabs per sex will be measured in each pot. Estimated counts will be made and the subsample will be randomly taken while non-measuring crabs are released. Sampling fractions will be recorded on each form, keeping the different sex/size groups separated.

All other captured invertebrates and fish will be identified to species and recorded. Commercially important species such as Greenland turbot *Reinhardtius hippoglossoides*, Pacific halibut *Hippoglossus stenolepis*, Pacific cod *Gadus macrocephalus*, sablefish *Anoplopoma fimbria*, and Atka mackerel *Pleurogrammus monopterygius* will be measured (fork length) as time allows (Fish Length Form, Appendix Figure A.3).

Pot catches will be recorded on the Species Composition Form (Appendix Figure A4). Carapace length, legal status, maturity (females), and shell condition will be recorded on the Crab Survey Data Form (Appendix, Figure A.5). Golden king crab catches will be tallied by sex, size and class, including legal, prerecruit ≥ 121 mm CL, sublegal 90-120 mm CL, sublegal < 90 mm CL, and mature and immature females (Station Catch Summary Form, Appendix Figure A.6).

Tagging Strategy

Golden king crabs will be tagged in anticipation of their recovery during projected commercial fisheries in 2003 and thereafter. Crabs selected from survey pots for tagging will include male and female crabs ≥ 90 mm CL that are free of parasitic barnacles (*Briarosaccus callosus*), cracked carapaces, torn leg segments, or any other obvious signs of recent injury. Crabs will be tagged through the isthmus muscle using Floy© tags as described by Gray (1965); the tags are fluorescent pink with fluorescent green tabs, numbered 'K' 00,001 through 'K' 15,000. Tagging goals by sex and legal/size classes and estimated tag releases as compared to the 2000 survey are as follows:

| Tagging Priority | Sex/Size Class | 2003 Survey | | 2000 Survey | | |
|---------------------|---|-----------------|-------------------------|------------------|------------------|-------------------|
| | | Tag Goal (%) | Estimated No. Tagged | Number Caught | Number Tagged | Percent Tagged |
| 1 | Legal Males | 100 | 2,500 | 2,542 | 2,012 | 79 |
| 1 | Prerecruit Males ≥ 121 mm CL | 100 | 5,100 | 5,100 | 4,056 | 80 |
| 2 | Sublegal Males ≥ 90 to ≤ 120 mm CL | 50 | 4,400 | 8,715 | 1,693 | 19 |
| 2 | Females ≥ 90 mm CL | 25 | 3,000 | 13,244 | 2,189 | 17 |
| Total Tagged: | | | 15,000 | 9,950 | | |

Submersible Conductivity Temperature Depth (CTD) Recorder

Bottom temperature profiles will be obtained from two stations fished each day by placing a Brancker® model XR-420 submersible (CTD) in a station survey pot to measure hourly bottom temperatures whenever deployed.

Tagged Crab Recovery

An intensive tagged-crab recovery program involving at-sea observers during the 2003/2004 and 2004/2005 Aleutian Islands golden king crab fishery seasons will be conducted. A news release will be issued prior to each season explaining the tagged crab recovery effort and attendant tag reward program. All recovered tagged crabs will be measured (CL) and assessed for shell condition, legal status (≥ 6 inches CW), and for females, reproductive characteristics (egg-bearing, barren, etc.). Complete capture location and depth (fathoms) from each tagged crab recaptured will be obtained from vessel captains. Tagged sublegal male crabs and all female crabs will be sampled, their tags left intact on the crab, and returned to the sea expeditiously. Recapture data will be documented on the Tagged Crab Recovery Form (Appendix Figure A.7).

DATA ANALYSIS

Catch per unit effort (CPUE) of golden king crabs during the 2003 survey will be summarized for sex-size classes (legal males, prerecruit males, males<121-mm CL, mature females, and immature females) by individual station and for the overall survey area. Maps with graphic depiction of CPUE by station will be prepared to identify spatial trends in golden king crab density. Frequency distribution of size (CL) by shell age will be summarized and graphed for males and females separately.

Tag recovery rates from the 2003/2004 season will be summarized overall and by station of release to determine spatial distribution of fishery mortality relative to preseason distribution. Estimates of harvest rates on male crabs will be estimated using a depletion estimator (Hilborn and Walters 1992). Minimum-distance and direction trends in movement of crabs from preseason release site to fishery capture site will be estimated. Size and shell age data recorded at release and recovery will be used to estimate molting probability and growth per molt by size-shell class of males and females between the preseason survey and the completion of the 2003/2004 season. Changes in reproductive condition of females will be used to determine timing of hatching, egg extrusion, and duration of reproductive cycle.

Tag recovery rates from the 2004/2005 season will be summarized overall and by station of release to determine spatial distribution of fishery mortality relative to 2003 preseason distribution. An adaptation of band recovery models (Brownie et al. 1985) to the differential recovery rates of males tagged as legals and sublegals will be used to provide an independent estimate of the harvest rate for the 2003/2004 fishery. Minimum-distance and direction trends in movement of crabs from 2003 preseason release site to 2004/2005 fishery capture site will be estimated. Size and shell age data recorded at release and recovery will be used to estimate molting probability and growth per molt by size-shell class of males and females between the 2003 survey and the completion of the 2004/2005 season. Changes in reproductive condition of females will be used to determine timing of hatching, egg extrusion, and duration of reproductive cycle.

SCHEDULES AND PERSONNEL

| Date | Activity | Personnel |
|-------------------|--|--|
| 1/03-5/03 | Project planning, solicit vessel charter bids | Watson, Pengilly |
| 1/03-5/03 | Prepare POP, PRs for major purchases, shipboard instructions, survey gear. | Watson, Pengilly |
| 7/1/2003-8/4-2003 | Conduct 30-day survey near Yunaska Island and Seguam Island. | Watson, Gish, Burt, Granath, and Lillo |
| 9/2003 | Edit and enter survey data. | Watson, Birdsall |
| 10/03-12/03 | Compile, analyze, and write survey report. | Watson |

-Continued-

| Date | Activity | Personnel |
|-------------|--|-----------|
| 1/20-4/04 | Tag recovery compiling and report. | Watson |
| 1/04-4/04 | Tag recovery compiling, analysis and report. | Watson |
| 10/03-12/03 | Compile, analyze, and write survey report. | Watson |

REPORTS

Results of this project will be reported in three Regional Information Reports:

- 1) Results of the 2003 Aleutian Islands golden king crab pot survey, which will detail the overall and local relative density (as indexed by survey catch per unit effort) of golden king crab by size-sex classes and provide an assessment of female reproductive condition.
- 2) Summary of tag recoveries from the 2003/2004 Aleutian Islands golden king crab fishery season, which will provide only a summary of tag recoveries for sex-size class by individual station and for the overall survey area.
- 3) Results and analysis of tag recoveries from the 2003/2004 and 2004/2005 Aleutian Islands golden king crab fishery seasons, which will provide estimates of harvest rates, spatial apportionment of harvest rates, and movements from preseason release site to fishery recovery site.

The schedule for Regional Information Reports pertaining to this project, including this Project Operational Plan, is given below.

| Date | Report | Author(s) |
|------|---|-----------|
| 5/03 | Project Operational Plan | Watson |
| 2/04 | Results of the 2003 Aleutian Islands golden king crab pot survey | Watson |
| 4/04 | Summary of tag recoveries from the 2003/2004 Aleutian Islands golden king crab fishery season. | Watson |
| 4/05 | Results and analysis of tag recoveries from the 2003/2004 and 2004/2005 Aleutian Islands golden king crab fishery seasons | Watson |

Semi-annual progress reports and final reports for NOAA grant NA16FN2621 on the work pertaining to this project will be prepared according to the following schedule.

| Date | Report | Author(s) |
|-------|-----------------------------|------------------|
| 6/03 | Semi-annual progress report | Watson, Pengilly |
| 12/03 | Semi-annual progress report | Watson, Pengilly |
| 6/04 | Semi-annual progress report | |
| 12/04 | Semi-annual progress report | |
| 6/05 | Semi-annual progress report | |
| 8/05 | Final project report | |

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- Watson, L.J., D. Pengilly, and S.F. Blau. 2002. Growth and molting of golden king crabs *Lithodes aequispinus* in the eastern Aleutian Islands, Alaska. Pages 169 – 187 in A.J. Paul et al. (eds.). Crabs in cold water regions: biology, management, and economics. University of Alaska Sea Grant, AK-SG-02-01, Fairbanks. 876 pp.

Table 1. Summary of the 1997 and 2000 golden king crab tagging survey releases and recoveries in the 1997 through 2002 Aleutian Islands commercial fisheries.

| Sex | 1997 Tag | Recovery Year | | | | | | Total | 2000 Tag | Recovery Year | | | |
|--------|----------|---------------|------|------|------|------|-------|-------|----------|---------------|------|------|-------|
| | Releases | 1997 | 1998 | 1999 | 2000 | 2001 | | | Releases | 2000 | 2001 | 2002 | Total |
| Male | 7,661 | 834 | 496 | 243 | 88 | 2 | 1,663 | | 7,761 | 729 | 144 | 127 | 1,000 |
| Female | 2,160 | 43 | 21 | 13 | 8 | 2 | 87 | | 2,189 | 59 | 2 | 18 | 79 |
| Total | 9,821 | 877 | 517 | 256 | 96 | 4 | 1,750 | | 9,950 | 788 | 146 | 145 | 1,079 |

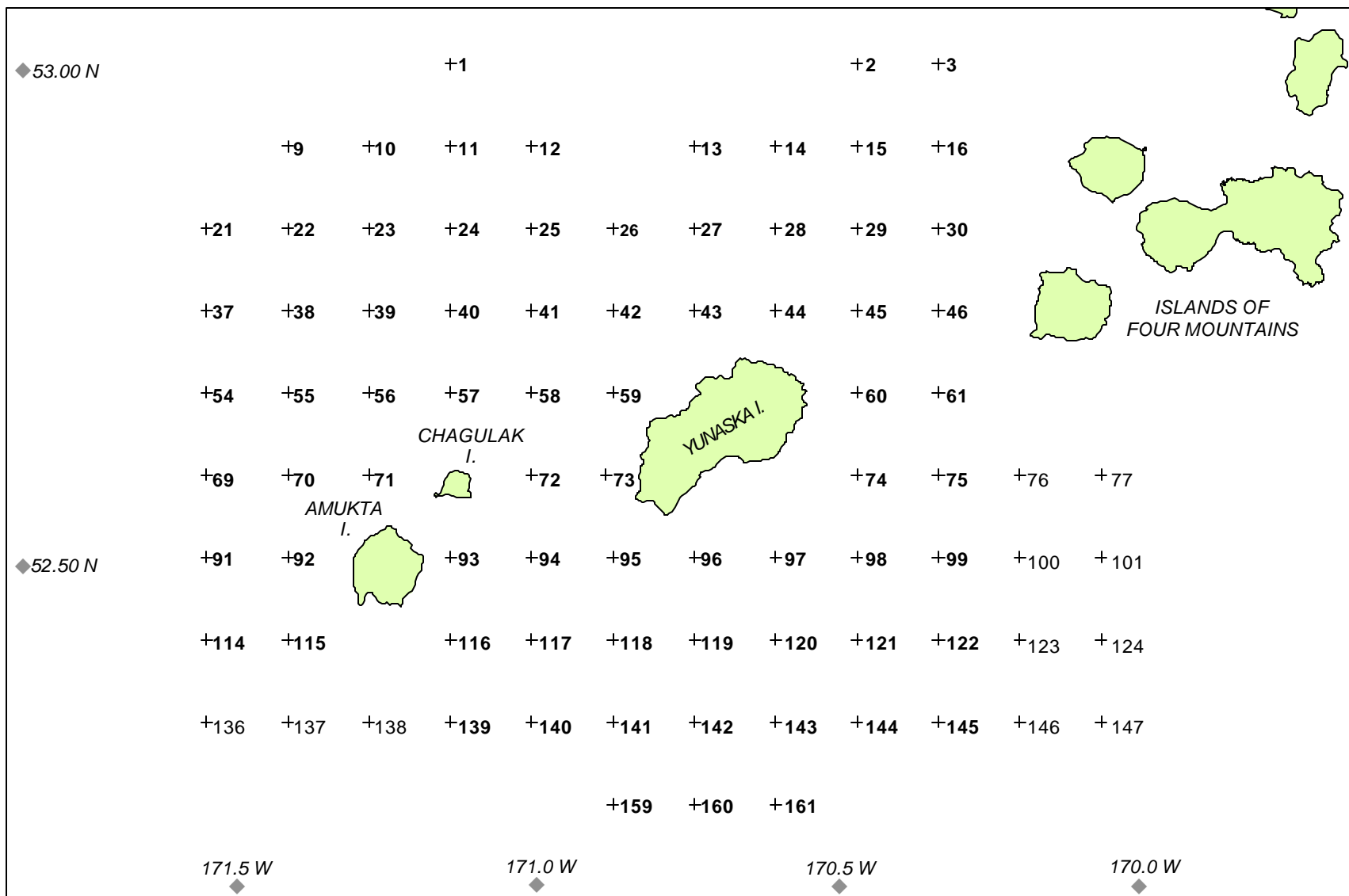


Figure 1. Location of the 74 core stations and the 11 secondary stations near Yunaska Island to be fished on the 2003 Aleutian Islands golden king crab survey. Core stations are bold-numbered.

Appendix. A.

Shipboard Instructions for the 2003
Triennial Aleutian Islands
Golden King Crab Survey

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May 12, 2003

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SURVEY ORIENTATION

Safety Briefing

Prior to departure from Dutch Harbor, both vessel and ADF&G crews are required in the contract to go through the following safety briefings on board the vessel lead by the captain:

1. Shipboard Safety Drill: Where personnel should be and what to do in emergency situations including: 1) where to go when the general alarm is pulled; location of life raft(s), skiff(s), survival suits, and EPIRBs 2) safe locations on deck when gear is being set or pulled, dangerous locations on deck during active gear working. A drill will be held at an unspecified time to test the ability of all crewmembers and ADF&G personnel to don their survival suits and help others don theirs.
2. General Vessel Orientation: Vessel tour including fire stations, medical supplies, etc.
3. Vessel Rules: Where to hang rain gear, water conservation issues and policies (showers-how often & how long, laundry, dishes, bathroom), galley manners, personnel issues, miscellaneous Dos and Don'ts.

Safety of all personnel and the vessel is the primary concern every day during the charter. Under international law, the captain is responsible for the safety of the vessel and all souls aboard. Obey the captain in regards to your safety and the safety of others. If you have any doubt at all about where you should be at any time, ask the captain. Avoid running, be careful, and watch out for your own safety and the safety of others. Do not go on deck alone or anywhere outside when seas are extremely rough or conditions are otherwise unsafe; no photos or video are worth the risk. Make sure all deck gear is secured so that the temptation to save gear when it gets wicked out can be precluded. When the gear is being worked, pay attention to the location of longlines, buoy trains, boom hooks and other flying objects. Stand at safe locations specified by the captain or deck boss when pots are being set, retrieved, moved or stacked.

Prior to departure, preferably several days before the vessel is scheduled to depart, each ADF&G crew member shall check his/her survival suit, and will wax the zipper and ensure that it works properly throughout its entire length. Place one large plastic bag at the entrance to each leg hole to ensure a quick donning of your suit if the need arises. Call the US Coast guard in Dutch Harbor (581-3466) for rules or times for testing EPIRBs; test the EPIRB and make sure it is securely attached to your suit. Test your strobe and make sure it has fresh batteries, and secure it to your suit. Practice donning your survival suit with a partner while clothed in full rain gear and boots. It is highly advisable that you also practice getting into the suit at a swimming pool prior to going to sea. Your peace of mind at sea will improve immensely if you have practiced and can get into your suit quickly, either on deck or in the water. If you don't know how to pack your suit or how to put it on, get someone who does to show you. If you must abandon ship, work with a buddy when getting into your survival suit; ensure that you and your buddy's zippers are up. If possible, secure a line between you and your buddy once you are in the water, but do not tie yourselves together prior to leaving the vessel. Generally, do not abandon ship until the last possible minute, as many boats that appear to be sinking remain afloat. Don't jump into the water unless there is no other option. The approved protocol for jumping off of vessels is described below.

Protocol for Jumping Off of Vessels (reprinted from Alaska Marine Safety Education Association)

Immersion suit wearers who jump in the water incorrectly can damage their eardrums when air inside a suit rushes into the hood. In addition, damage to one's neck, back, or the suit's zipper can occur when jumping with an inflated air bladder. The diagram below shows the proper way to jump from a height while wearing an immersion suit.



To avoid injury, place the hand farthest from the vessel being abandoned inside the hood or neck of the suit before jumping. This creates a gap between the hood and face that will allow the air in the suit to escape.

Once the wearer enters the water, the hydrostatic squeeze of water pressure rapidly forces air from the legs and body of the suit into the hood. The more bulky and a loose fitting the suit, the more likely air will rush into the hood. Without a path for the air to escape, the pressure inside the head can be painful and even damaging to eardrums.

This same hand can be used to cover and protect the airway so the jumper does not involuntarily suck in any water through the gasping reflex.

Also, the immersion suit's air bladder should *not* be inflated if a jump is necessary. If it is, the jumper will come to a sudden and stressful stop once the inflated bladder with all its buoyancy hits the surface of the water. This can result in damage to wearer's neck or back. Damage to the suit's zipper and air bladder can also occur. On some suits the bladder is attached to the zipper, and the force of impact can rip the zipper apart. This damage has occurred even when jumping into the water from a standing position on a dock.

In addition to these two precautions, the jumper should place the hand nearest the vessel atop the hood. This does two things. It protects the side of the head near the vessel from hitting the vessel's side. Also, it keeps the hood in place while entering the water. It is easy for the hood to slip off during entry, especially if the immersion suit is large for the wearer. A well-anchored hood is critically important in preventing water from entering the airway, and in keeping the immersion suit wearer warm while in the water.

Enter the water correctly during training or drills. Learning the correct technique during the nonemergency situation can prevent unnecessary injury during an actual emergency.

Miscellaneous Shipboard Rules and Reminders

- There will be no unauthorized retention of any animal for any purpose (i.e., home packing or bait) captured during the survey by vessel or ADF&G crewmembers. Collection of crabs for display or other purposes will be authorized through the crew leader. L. Watson holds the scientific collecting permit for the survey; the individual will itemize all requests for specimens to be collected.
- Be considerate of others, maintain a sense of humor, and be patient while onboard the vessel. Keep your living quarters, work areas, and common areas neat. Please wash up thoroughly before meals. Extend offers to assist in meal preparation and dish washing.
- Vessel and ADF&G crews will work as a team particularly when sorting the catch and tagging crabs. Any personality conflicts will be resolved by the captain and crew leader; should situations arise that could escalate, notify them immediately.
- The crew leader has the authority to delay or halt the charter at any time (if conditions are unsafe, or so unworkable that necessary at-sea duties cannot be carried out) and has the authority to delay or halt the charter due to insubordination by any person on board.
- The captain is responsible for the safety of the vessel and all crew aboard; in such matters, the captain has sole authority to halt fishing operations in unsafe or dangerous conditions.
- ADF&G crew must maintain all sampling equipment and ensure that calipers are cleaned daily. Store calipers, clipboards, tags, etc., inside the vessel at the end of each sampling day. All sampling gear should be in a designated area out of the mainstream traffic pattern. Ensure that laptop computer(s) and the printer are secured at all times. Prior to the end of each day, ADF&G crewmembers will check with the crew leader to ensure that all tasks are completed. Each ADF&G crewmember will be assigned some sort of data checking or tag preparation activity each evening.
- When lifting anything, no matter how light it is, bend at the knees, keep your back straight and lift the object using your legs.

Instructions to the Captain

Consult with the crew leader prior to planning the fishing order of the stations and when pots are first picked in the morning and when setting should begin for the following day's pick. The approximate spacing between stations is 5 nmi (Figure A.1). Each station consists of 10 longlined king crab pots (supplied by ADF&G). The target soak time for each pot is 48 hours. Departures from the soak time goal may occur, but those less than 36 hours or greater than 60 hours are considered unacceptable unless unexpected high winds occur. The primary factor to consider when planning gear-setting strategies is to adhere to the 48-hour soak time goal for each pot. Stations will be set in groups of 3 or 4 on alternating days; an itinerary for completion of survey sampling is in Table A.1. Changes can be made if bad weather slows or prohibits setting or picking gear, or if crab catches are great.

Radio Schedule. A daily radio schedule will be maintained between the vessel and the Dutch Harbor ADF&G office (WIM 76) or the vessel's regular processor and is the duty of the captain. The daily catch log will be reported via email through *Stratos* and is the responsibility of the crew leader. That record will contain dates and station numbers fished, and the number of male and female golden king crabs caught. The vessel shall be reimbursed for costs associated with State use of *Stratos*.

Setting and Retrieving Gear. When setting or retrieving gear use the pilothouse log to report all required data for each pot (Figure A.2). Unique, sequential pot numbers will be assigned for each pot in successive stations. Temperature recorders (CTDs) will be placed in two different flagged pots and will be noted as either T1 (flagged with green) or T2 (flagged with pink or red) on the pilothouse log. The CTDs will be switched regularly to sample the range of depths fished.

We will try to stay on a schedule of retrieving the first pot by 0700 each day. Notify the ADF&G crew at least 30 minutes before the first pot is pulled in the morning so that we are ready for sampling. When each pot comes aboard, you must tell the ADF&G deck crew what the sequential pot number is for each pot as it comes aboard. If a pot is lost, was set without bait, or otherwise did not fish properly, note that on the Pilot House Log, and inform the ADF&G deck crew. Do not erase the sequential pot number of any lost pot or pot that had a poor performance.

SURVEY DESIGN

Area and Coverage Goals

The 2003 survey station grid encompasses the area between 52.25° – 53° N latitude and 170.25° – 171.6° W longitude and is composed of 74 core stations and 11 secondary stations each spaced 5 nmi apart north-to-south and east-to-west (Figure A.1). Station coordinates are listed in Table A.2. Each station will be sampled using 10 pots spaced 10 fm apart on a longline, with a target soak time of 48 h per pot. In the event that all 74 core stations are successfully sampled, a set of 11 secondary stations may also be fished (Figure A.1). Adequate time to fish the core stations is expected; however, inclement weather and strong tidal currents may occasionally hamper survey progress. Approximately two of the 30 days allotted will be necessary for vessel travel to and from the survey grounds and up to two days for necessary gear preparation. The proposed survey itinerary is outlined in Table A.1.

Pot Deployment

Each station will be fished with a 10-pot string and on alternating days, stations will be set in groups of 3 or 4 (Figure A.1). Fishing parameters such as station and sequential pot number, set date and time, lift date and time, bottom type (rock, sand, silt, mud, or gravel), latitude and longitude, and gear performance will be reported on the Pilot House Log (Figure A.2).

Gear Description

Seventy-five identical king crab pots measuring 7' x 7' x 34" supplied by ADF&G will be used. Each pot is webbed with #92 nylon twine with a stretch mesh of 2¾", has two opposing 8" x 36" tunnel eye openings installed with fingers to reduce escapement of captured crabs from the pot. Each pot will be baited with one gallon of frozen chopped herring.

POT SAMPLING AND TAGGING PROCEDURES

Catch Sampling

The contents of each pot fished will be enumerated to provide catch per unit effort data for golden king crabs, scarlet king crabs *Lithodes couesi*, grooved Tanner crabs *Chionoecetes tanneri*, triangle Tanner crabs *C. angulatus*, and deep sea king crabs *Paralomis multispina* and *P. verrilli*. A determination of legal versus sublegal males, shell condition (age) of males and females, and female reproductive status will be assessed for each species. Carapace length (CL) of king crabs will be measured from the posterior margin of the right eye orbit to the midpoint of the rear margin of the carapace as in Wallace et al. (1949). Carapace width (CW) of Tanner crabs will be measured across the carapace at the widest part perpendicular to the medial line, with the tips of the calipers reaching inside the lateral spines. All other captured invertebrates and fish will be identified and recorded. Commercially important species such as Greenland turbot *Reinhardtius hippoglossoides*, Pacific halibut *Hippoglossus stenolepis*, Pacific cod *Gadus macrocephalus*, sablefish *Anoplopoma fimbria*, and Atka mackerel *Pleurogrammus monopterygius* will be measured (fork length) as time allows (Fish Length Form, Figure A.3).

Excluding legal males and prerecruit males ≥ 121 mm CL, a subsample of male and female golden king crabs for length distribution, shell condition, and female reproductive data may be taken. Subsampling of pot catches will only be done when successive pots within a station contain a large number of crabs and that sampling the full pot contents would unnecessarily delay overall survey progress. A minimum of 100 crabs per sex will be measured in each pot. Estimated counts will be made and the subsample will be randomly taken while non-measuring crabs are released. Sampling fractions will be recorded on each form, keeping the different sex/size groups separated.

Pot catch data, including the number of golden king crabs, will be recorded on the Species Composition Form (Figure A.4). Carapace length, legal status, maturity (females), and shell condition (see below) will be recorded on the Crab Survey Data Form (Figure A.5).

Shell Condition. The best place to estimate shell age is on the ventral side of the coxa of the walking legs (pereopods) and meri.

Soft-shell: Crab has molted within weeks. Exoskeleton is still soft from recent molt.

New-shell-pliable: Coxa and ventral surface of exoskeleton shiny, not scratched or pitted. Legs easily compressed when pinched (legs contain little meat at this time). Exoskeleton is fragile and subject to breakage when handled or dumped from the pot. If carapace is removed, the gills will be

translucent-cream in color. Crabs estimated to have had new-pliable exoskeletons for approximately two weeks to 3 months after molting.

New-shell-hard: Coxa and ventral surface of exoskeleton dull white. Legs mostly full of meat, meri not easily compressed by pinching. If carapace is removed, the gills will be a light cream color. During August, this category includes most ovigerous females and those with matted setae.

Old-shell: Distal portion of the ventral coxa is partially or totally covered with brown scratches or dots. Legs are full of meat, meri are not easily compressed when pinched. If carapace is removed, gills will be tan in color due to fouling by microorganisms. Rarely are females assessed in this category.

Very old-shell: Distal portion of ventral coxa densely covered with black scratches or dots. Legs full of meat, meri not easily compressed when pinched. Carapace is darkened by black spots at the base of spines. Tips of dactyls are worn, rounded, and black. If carapace is removed, gills will be dark gray or gray-black in color due to fouling by microorganisms.

Golden king crab catches will be tallied by sex, size and class, including legal, prerecruit ≥ 121 mm CL, sublegal 90-120 mm CL, sublegal < 90 mm CL, and mature and immature females (Station Catch Summary Form, Figure A.6).

Tagging Strategy

Golden king crabs will be tagged in anticipation of their recovery during projected commercial fisheries in 2003 and thereafter. Crabs selected from survey pots for tagging will include male and female crabs > 90 mm CL that are free of parasitic barnacles (*Briarosaccus callosus*), cracked carapaces, torn leg segments, or any other obvious signs of recent injury. Crabs will be tagged through the isthmus muscle using Floy© tags as described by Gray (1965); the tags are fluorescent pink with fluorescent green tabs, numbered 'K' 00,001 through 'K' 15,000.

All (100%) of the captured legal-sized males (≥ 6 inches CW, measured outside the lateral spines) and prerecruit males > 121 mm CL will be tagged. Sublegal-sized males ≥ 90 mm CL and ≤ 120 mm CL will be tagged at a rate of 50% and females ≥ 90 mm CL at 25%. An estimated 10,000 – 15,000 crabs will be tagged during the survey, distributed as shown below.

| Tagging Priority | Sex/Size Class | Tagging Goal (%) | Estimated No. Tagged |
|-----------------------|---|------------------|----------------------|
| 1 | Legal Males | 100 | 2,500 |
| 1 | Prerecruit Males ≥ 121 mm CL | 100 | 5,100 |
| 2 | Sublegal Males ≥ 90 to ≤ 120 mm CL | 50 | 4,400 |
| 2 | Females ≥ 90 mm CL | 25 | 3,000 |
| Survey Tagging Total: | | | 15,000 |

Tagged Crab Recoveries. Tagged golden king crabs from the 1997 and 2000 surveys may be captured during the survey. All recovery information (sex, size, shell condition, recapture location, and reproductive data) will be recorded on the Tagged Crab Recovery form (Figure A.7). The tag will remain on the crab, even if it is of legal size, and released as soon as possible near the capture location.

Temperature Profiles. Bottom temperatures will be obtained by placing Brancker Model XR-420 submersible conductivity temperature depth recorders (CTDs) in pots to measure hourly bottom temperatures whenever deployed. One pot from two different stations will be selected to carry a CTD each day.

Daily Data Checking

Each day data is collected it will be checked for accuracy by crosschecking what was recorded, by a person other than the recorder. This includes all forms that have been used that day (e.g., Pilot House Log, Crab Survey Data form, Species Composition form). In addition, the male and female golden king crab catch by Station Catch Summary form (Figure A.6) will be completed and summarized for transmission to the ADF&G office in Dutch Harbor.

Table A.1. Itinerary for the 2003 Aleutian Islands golden king crab tagging survey near Yunaska Island.

| Date | Activity | Station Numbers | Stations Set |
|------|---|-----------------|--------------|
| July | | | |
| 1 | Load survey gear and prepare pots. | - | - |
| 2 | Continue gear prep and travel to survey area. | - | - |
| 3 | CORE STATIONS - Set gear | 2,3,15,16 | 4 |
| 4 | Set gear | 29,30,45 | 3 |
| 5 | Set/pick gear | 46,60,61,75 | 4 |
| 6 | Set/pick gear | 74,98,99 | 3 |
| 7 | Set/pick gear | 121,122,144,145 | 4 |
| 8 | Set/pick gear | 143,160,161 | 3 |
| 9 | Set/pick gear | 97,119,120,142 | 4 |
| 10 | Set/pick gear | 95,96,118 | 3 |
| 11 | Set/pick gear | 139,140,141,159 | 4 |
| 12 | Set/pick gear | 93,116,117 | 3 |
| 13 | Set/pick gear | 59,72,73,94 | 4 |
| 14 | Set/pick gear | 41,42,58 | 3 |
| 15 | Set/pick gear | 27,28,43,44 | 4 |
| 16 | Set/pick gear | 13,14,26 | 3 |
| 17 | Set/pick gear | 11,12,24,25 | 4 |
| 18 | Set/pick gear | 1,9,10 | 3 |
| 19 | Set/pick gear | 21,22,37,38 | 4 |
| 20 | Set/pick gear | 23,39,40 | 3 |
| 21 | Set/pick gear | 55,56,57,71 | 4 |
| 22 | Set/pick gear | 54,69,70 | 3 |
| 23 | Set/pick gear | 91,92,114,115 | 4 |
| 24 | Set/pick gear | 136,137,138 | 3 |
| 24 | Set/pick gear | 146,147,123,124 | 3 |
| 26 | Set/pick gear | 124,100,101 | 3 |
| 27 | Set/pick gear | 76,77 | 2 |
| 28 | Pick gear | - | - |
| 29 | Pick gear/travel to Dutch Harbor | | |
| 30 | Arrive Dutch Harbor and offload survey gear | | |

Table A.2. Midpoint locations of the 74 primary stations and 11 secondary stations near Yunaska Island to be fished on the 2003 golden king crab survey.

| Station | Degrees N latitude | Degrees W. Longitude | Station | Degrees N latitude | Degrees W. Longitude |
|---------|-----------------------|-------------------------|------------------|-----------------------|-------------------------|
| 1 | 53.00 | 171.15 | 72 | 52.58 | 171.01 |
| 2 | 53.00 | 170.47 | 73 | 52.58 | 170.89 |
| 3 | 53.00 | 170.34 | 74 | 52.58 | 170.47 |
| 9 | 52.92 | 171.42 | 75 | 52.58 | 170.34 |
| 10 | 52.92 | 171.28 | 76 ^a | 52.58 | 170.20 |
| 11 | 52.92 | 171.15 | 77 ^a | 52.58 | 170.07 |
| 12 | 52.92 | 171.01 | 91 | 52.50 | 171.55 |
| 13 | 52.92 | 170.74 | 92 | 52.50 | 171.42 |
| 14 | 52.92 | 170.61 | 93 | 52.50 | 171.15 |
| 15 | 52.92 | 170.47 | 94 | 52.50 | 171.01 |
| 16 | 52.92 | 170.34 | 95 | 52.50 | 170.88 |
| 21 | 52.83 | 171.55 | 96 | 52.50 | 170.74 |
| 22 | 52.83 | 171.42 | 97 | 52.50 | 170.61 |
| 23 | 52.83 | 171.28 | 98 | 52.50 | 170.47 |
| 24 | 52.83 | 171.15 | 99 | 52.50 | 170.34 |
| 25 | 52.83 | 171.01 | 100 ^a | 52.50 | 170.20 |
| 26 | 52.83 | 170.88 | 101 ^a | 52.50 | 170.07 |
| 27 | 52.83 | 170.74 | 114 | 52.42 | 171.55 |
| 28 | 52.83 | 170.61 | 115 | 52.42 | 171.42 |
| 29 | 52.83 | 170.47 | 116 | 52.42 | 171.15 |
| 30 | 52.83 | 170.34 | 117 | 52.42 | 171.01 |
| 37 | 52.75 | 171.55 | 118 | 52.42 | 170.88 |
| 38 | 52.75 | 171.42 | 119 | 52.42 | 170.74 |
| 39 | 52.75 | 171.28 | 120 | 52.42 | 170.61 |
| 40 | 52.75 | 171.15 | 121 | 52.42 | 170.47 |
| 41 | 52.75 | 171.01 | 122 | 52.42 | 170.34 |
| 42 | 52.75 | 170.88 | 123 ^a | 52.42 | 170.20 |
| 43 | 52.75 | 170.74 | 124 ^a | 52.42 | 170.07 |
| 44 | 52.75 | 170.61 | 136 ^a | 52.33 | 171.55 |
| 45 | 52.75 | 170.47 | 137 ^a | 52.33 | 171.42 |
| 46 | 52.75 | 170.34 | 138 ^a | 52.33 | 171.28 |
| 54 | 52.67 | 171.55 | 139 | 52.33 | 171.15 |
| 55 | 52.67 | 171.42 | 140 | 52.33 | 171.01 |
| 56 | 52.67 | 171.28 | 141 | 52.33 | 170.88 |
| 57 | 52.67 | 171.15 | 142 | 52.33 | 170.74 |
| 58 | 52.67 | 171.01 | 143 | 52.33 | 170.61 |
| 59 | 52.67 | 170.88 | 144 | 52.33 | 170.47 |
| 60 | 52.67 | 170.47 | 145 | 52.33 | 170.34 |
| 61 | 52.67 | 170.34 | 146 ^a | 52.33 | 170.20 |
| 69 | 52.58 | 171.55 | 147 ^a | 52.33 | 170.07 |
| 70 | 52.58 | 171.42 | 159 | 52.25 | 170.88 |
| 71 | 52.58 | 171.28 | 160 | 52.25 | 170.74 |
| | | | 161 | 52.25 | 170.61 |

^a Secondary survey stations.

Table A.3. Equipment list.

EQUIPMENT FOR ADF&G PERSONNEL

1. Survival suit with attached EPIRB, strobe and water-activated light
2. Rain gear, boots, gloves
3. Stormy Seas jacket

DECK/SAMPLING EQUIPMENT

1. (1) 4'x8' aluminum sorting table with 4 stands
2. (2) wood dividers for sorting table
3. (2) aluminum measuring tables with adjustable legs
4. (12) thin, 3" hex head bolts and appropriate-sized socket wrench for table assembly
5. (8) clipboards (6 legal size, 2 regular size)
6. (4) covered clipboards (aluminum or plastic)
7. Variety of wood screws (1 pound each of 1", 2", and 3")
8. (4) pair calipers, large size with millimeter scale
9. (6) 5.5# measuring sticks
10. (2) cans WD-40
11. (3) sets of #11-20 wood clip-on number tags
12. (4) dump totes
13. (10) bushel baskets (5 orange, 5 black)
14. (4) garbage cans
15. (5) plastic Rubbermaid totes with lids
16. Assorted plastic bags: (20) Hefty large trash, (30) 1-gallon Zip-locks; (50) 1-quart Zip-locks.
17. (3) rolls flagging tape, each a different color, to include green
18. (40) rolls electrical tape
19. (3) liters of 100% formalin
20. (2) syringes
21. (5) assorted specimen jars
22. (1) roll 3/8" yellow buoy line
23. (2) rolls biodegradable cotton twine
24. (4) rolls twine (2 orange, 2 black)
25. Bag of halibut snaps
26. Germicide

FORMS

1. 75 Pilot House Log forms
2. 100 Fish Length forms.
3. 100 Species Composition forms
4. 2500 Crab Survey Data forms
5. 50 Station Catch Summary forms.
6. 20 Tagged Crab Recovery forms

CHARTS AND BOOKS

1. (2) NOAA St. Matthew NOS NP-2-7 charts
2. (1) Alaska's Saltwater Fishes and Other Sea Life (Kessler)
3. (1) Pacific Fishes of Canada (Hart)
4. (1) NMFS Species Code book

OFFICE AND MISCELLANEOUS SUPPLIES

1. (2) crew leader notebooks (3-ring binders)
2. (2) hand-held calculators
3. (10) mechanical pencils
4. (5) ink pens
5. (100) sheets plain paper
6. (50) sheets Rite-in-the-Rain paper
7. Rite-in-the-Rain notebooks:
(5) pocket size (3 1/4"x5 3/4")
(5) field notebooks (4 5/8"x7")
8. North Star medical kit
9. 25-ft power cord
10. Buss bar
11. 1 notebook computer with cables and connectors
12. Cannon BubbleJet printer with cables, connectors, and spare ink cartridge
13. (10) 3.5" diskettes
14. (20) pair earplugs
15. Permanent markers
16. Highlighting markers
17. 3-ring hole punch
18. (50) rubber bands, assorted, including large to fit clipboards
19. (2) rolls each: Scotch tape, 3" 3M-tpe clear tape, and duct tape
20. Paper clips

CAMERA EQUIPMENT

1. Minolta 8-mm camcorder
2. (4) 8-mm tapes
3. Digital camera

**SUBMERSIBLE TEMPERATURE
RECORDER EQUIPMENT**

1. 2 CDTs, with housings and pot clips
 2. fresh 'D' cell batteries
 3. software
 4. instruction manual
 5. cabling
-

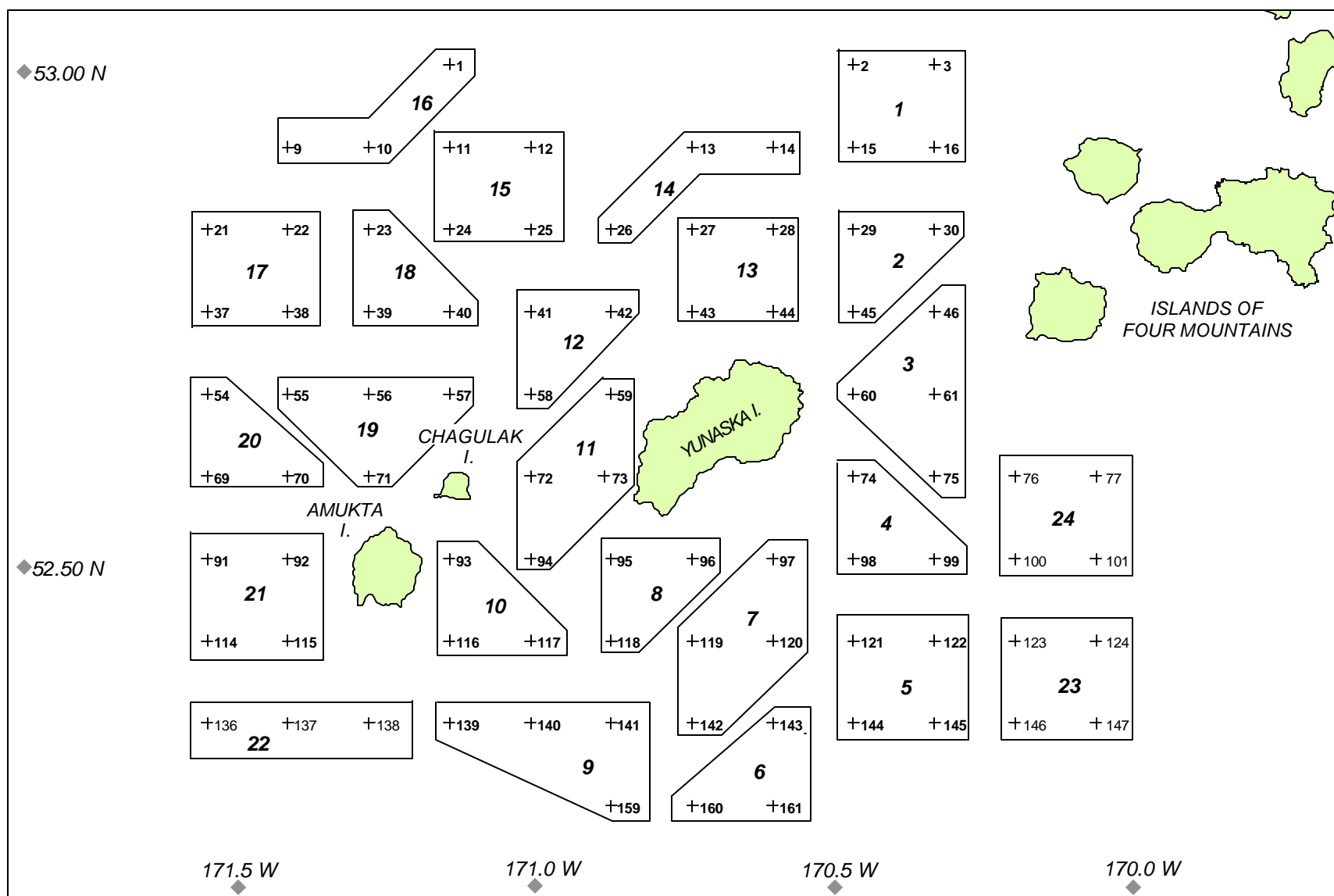


Figure A.1. Location of the 74 core stations and the 11 secondary stations by station block to be fished on the 2003 Aleutian Islands golden king crab survey. Core stations are bold-numbered.

[illegible]

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Figure A.4. Species composition form.

ADF&G 2003 ALEUTIAN ISLANDS GOLDEN KING CRAB SURVEY
SPECIES COMPOSITION FORM

RECORDER: _____

PG _____ OF _____

[illegible]

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| SAMPLING DATE: | | | | ADF&G 2003 ALEUTIAN ISLANDS GOLDEN KING CRAB | | | | | | | | | | PG ____ OF ____ | |
|---|---------|-----|-----------|--|-------|---------|--------|-------------------|--------|-------|--------|-----------------|----------|----------------------------|--|
| <div><div></div><div></div><div></div><div></div><div>0</div><div>3</div></div> | | | | CRAB SURVEY DATA FORM | | | | | | | | | | VESSEL: <u>FV BALLYHOO</u> | |
| STATION NUMBER: | | | | SAMPLING FRACTION: | | | | START BUOY: _____ | | | | MEASURER: _____ | | | |
| <div><div></div><div></div><div></div></div> | | | | <div><div></div><div></div><div>/</div><div></div><div></div><div></div></div> | | | | END BUOY: _____ | | | | RECORDER: _____ | | | |
| SEQUENTIAL POT NUMBER | SPECIES | SEX | SIZE (MM) | LEGAL | SHELL | EMBRYOS | | | | OTHER | SERIES | TAG NUMBER | COMMENTS | | |
| | | | | | | COLOR | DEVEL. | COND. | CLUTCH | | | | | | |
| 1 | | | | | | | | | | | K | | | | |
| 2 | | | | | | | | | | | K | | | | |
| 3 | | | | | | | | | | | K | | | | |
| 4 | | | | | | | | | | | K | | | | |
| 5 | | | | | | | | | | | K | | | | |
| 6 | | | | | | | | | | | K | | | | |
| 7 | | | | | | | | | | | K | | | | |
| 8 | | | | | | | | | | | K | | | | |
| 9 | | | | | | | | | | | K | | | | |
| 10 | | | | | | | | | | | K | | | | |
| 11 | | | | | | | | | | | K | | | | |
| 12 | | | | | | | | | | | K | | | | |
| 13 | | | | | | | | | | | K | | | | |
| 14 | | | | | | | | | | | K | | | | |
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| 18 | | | | | | | | | | | K | | | | |
| 19 | | | | | | | | | | | K | | | | |
| 20 | | | | | | | | | | | K | | | | |
| 21 | | | | | | | | | | | K | | | | |
| 22 | | | | | | | | | | | K | | | | |
| 23 | | | | | | | | | | | K | | | | |
| 24 | | | | | | | | | | | K | | | | |
| 25 | | | | | | | | | | | K | | | | |

| | | | | | |
|---|--|---|---|---|---|
| <u>Crab Species</u> 1-L. aequispinus 2-P. camtschaticus 3-P. platypus 4-E. isenbeckii 6-C. bairdi 7-C. opilio | <u>Shell</u> 0-soft 1-new/pliable 2-new/hard 3-old 4-very old | <u>Live Embryo Color</u> 1-tan 2-purple 3-brown 4-orange 5-purple/brown 6-pink 7-reddish 0-other (describe) | <u>Embryo Development</u> 1-uneeyed 2-eyed 3-hatching(1-29% clutch w/matted setae) <u>Percent Clutch</u> 1-barren, clean pleopods 2-barren, matted pleopods (empty embryo cases) 3-clutch 1-29% full | <u>Clutch Condition</u> 1-dead embryos not apparent 2-dead embryos <20% 3-dead embryos >20% 4-clutch 30-59% full 5-clutch 60-89% full 6-clutch 90-100% full | <u>Other</u> 1-dead 3-nemertean in clutch 4-turbellarians in clutch 5-black mat 6-bitler crab dis. 7-"cottage cheese" disease 8-shell disease (torch/rust) 9-Briarosaccus callosus 0-leatherback 10-snailfish eggs under carapace 11-deformed carapace/aills |
| <u>Sex</u> 1-male 2-female | <u>Legal</u> 1-subleg. 3-juv. fem. 2-legal 4-adult fem. | | | | |

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FV BALLYHOO

ADF&G 2003 ALEUTIAN ISLANDS GOLDEN KING CRAB SURVEY
STATION CATCH SUMMARY

PG ____ OF ____

RECORDER _____

| STATION | | | SEQUENTIAL POT NUMBER | | | | | MALES | | | | | | FEMALES | | COMMENTS |
|---------|--|--|--------------------------|--|--|--|--|-----------------------|----------------------|------------------------------------|-----------------------------------|---------------------|-----------------|-------------|--|----------|
| | | | | | | | | PREREC. (90-119mm) | MATURE (ge 105mm) | RECRUIT newshell (120-133mm) | POSTREC oldshell (ge 120mm) | LEGAL (ge 120mm) | small <80 mm | large >80mm | | |
| | | | | | | | | | | | | | | | | |
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| STATION | | | TOTALS | | | | | | | | | | | | | |
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Figure A.7. Tagged crab recovery form.

ADF&G WESTWARD REGION TAGGED CRAB RECOVERY FORM

SPECIES _____

FISHERY CODE _____

OBSERVER/ _____
DOCKSIDE SAMPLER

| SEQ. POT NO. | FLOY TAG SERIES & NUMBER | SIZE (mm) KING - CL TANNER - CW | LEGAL (a) | SEX (b) | SHELL (c) | FATE (d) | CAPTURE DATE | | | CAPTURE LOCATION (Note: "E." longitude if applicable) | | DEPTH (FM) | STATISTICAL AREA | ADF&G VESSEL NO. |
|-----------------|-----------------------------|---------------------------------------|--------------|------------|--------------|-------------|--------------|-----|------|--|--------------|---------------|---------------------|---------------------|
| | | | | | | | MO. | DAY | YEAR | N. LATITUDE | W. LONGITUDE | | | |
| 1 | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | |

(a) **LEGAL:** 1=Sublegal; 2=Legal.

(b) **SEX:** 1=Male; 2=Female.

(c) **SHELL AGE:** 0=Soft; 1=New; 2=Old; 3= Very Old.

(d) **FATE:** 1=Retained for sale; 2=Released alive; 3=Dead (not retained for sale; found in deadloss pile or frozen whole for ADF&G/Observer sampling).

NOTE: If a tagged female crab, record additional information on the back of this form. Record comments for males and females on the back of this form.

| | Received Tag or Tagged Crab From: Name, Address & Phone | Received Recovery Location Data From: Name, Address & Phone | Vessel Name | Processor Name | Sampling Date | | |
|---|--|--|-------------|----------------|---------------|-----|------|
| | | | | | Mo. | Day | Year |
| 1 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |
| 2 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |
| 3 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |
| 4 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |
| 5 | Needs hat <input type="checkbox"/> Issued hat <input type="checkbox"/> | | | | | | |

Edited by:

Date:

Entered by:

Date:

-Continued-

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Figure A.7. (page 2 of 2)

ADF&G WESTWARD REGION TAGGED CRAB RECOVERY FORM
(REVERSE SIDE)

| * SEQ. POT NO. | EMBRYOS | | | | OTHER | COMMENTS |
|-------------------------|---------|-------------|-----------|----------|-------|----------|
| | COLOR | DEVELOPMENT | CONDITION | % CLUTCH | | |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |

LIVE EMBRYO
COLOR

- 1-Tan
- 2-Purple
- 3-Brown
- 4-Orange
- 5-Purple-brown
- 6-Pink
- 7-Reddish
- 0-Other; describe in
Comments.

EMBRYO
DEVELOPMENT

- 1-Uneyed
- 2-Eyed

CLUTCH
CONDITION

- 1-Dead embryos not
apparent
- 2-Dead embryos <20 %
- 3-Dead embryos >20%

PERCENT CLUTCH

- 1-Barren, clean pleopods
- 2-Barren, with empty
embryo cases and/or
stalks
- 3-Clutch 1-29% full
- 4-Clutch 30-59% full
- 5-Clutch 60-89% full
- 6-Clutch 90-100% full

OTHER

- 3-Nemerteans in clutch
- 4-Turbellarians in clutch
- 5-Black mat syndrome
- 6-Bitter crab syndrome
- 7-"Cottage cheese" disease
- 8-Shell rust
- 9-*Briarosaccus callosus*
(sac-like parasitic barnacle
on king crab abdomens)
- 0-Leatherback: male brown
king crab w/soft carapace &
is old or very old shell

| SPECIES | CHANGES IN EMBRYO COLOR | | COMMENTS |
|-----------------------------|-------------------------|-----------------------|---|
| | UNEYED | EYED-WELL DEVELOPED | |
| Red King | Purple | Reddish | Occasionally brown or gray intermediate. |
| Blue King | Purple | Pinkish-reddish | |
| Golden (brown) king | Orange | Tan | |
| Tanner (<i>C. bairdi</i>) | Orange | Brown or purple brown | |
| Snow (<i>C. opilio</i>) | Orange | Brown or purple brown | |

Note: If other species are tagged, update this form before use.

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If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

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